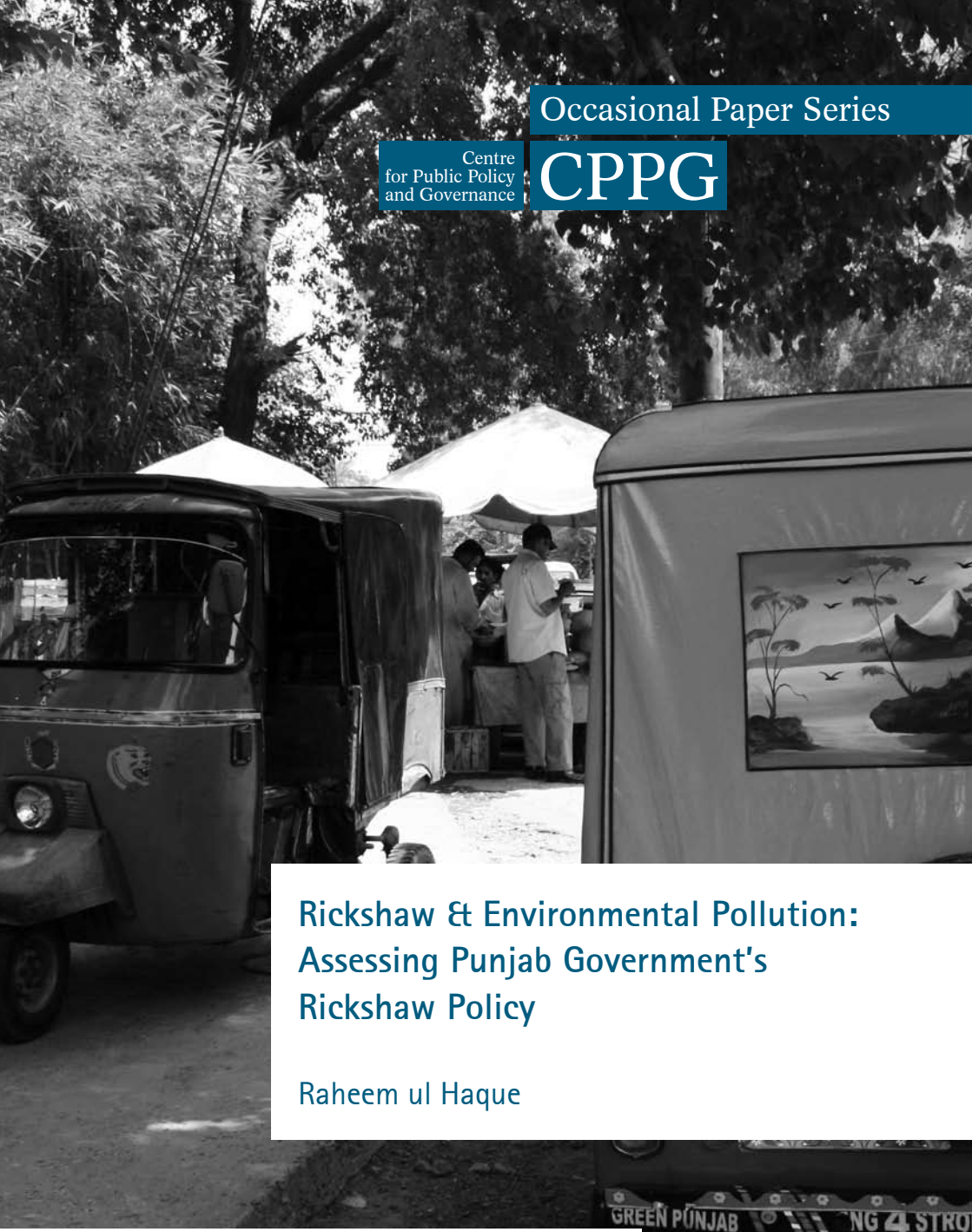

Occasional Paper Series

Centre for Public Policy and Governance

CPPG

Rickshaw & Environmental Pollution: Assessing Punjab Government's Rickshaw Policy

Raheem ul Haque

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List of Abréviations

AAQ	Ambient Air Quality
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CNG	Compressed Natural Gas
CPPG	Centre for Public Policy & Governance
DHA	Defense Housing Authority
DoT	Department of Transport
EDB	Engineering Development Board
EPA	Environment Protection Agency
GoP	Government of Punjab
HC	Hydro Carbon
LPG	Liquefied Petroleum Gas
MVE	Motor Vehicle Examiners
NBP	National Bank of Pakistan
NEQS	National Environmental Quality Standards
NO_x	Nitrogen Oxide
PEPC	Pakistan Environmental Protection Council
PM	Particulate Matter
PPCB	Punjab Provincial Cooperative Bank
PSIC	Punjab Small Industries Corporation
PSQCA	Pakistan Standards and Quality Control Authority
PTCL	Pakistan Tele Communication Limited
SO_2	Sulfur Dioxide
WHO	World Health Organization

Preface

The report focuses on two critical issues, first to what degree Rickshaws are a problem in causing noise and environmental pollution in the city of Lahore. Second, it ventures to explain the process of policy formulation of converting 2 stroke engine Rickshaws to 4 stroke engine CNG Rickshaws. Was the process well conceived and thought through? Did it take into account the economic feasibility of the project? Were the stakeholders consulted? Were the President's Rozgar Scheme and Chief Minister Green Punjab Scheme simply tools of political expediency or aimed at developing an environment friendly transport policy? Examining and analyzing such questions the report identifies the inadequacies and gaps in the Rickshaw conversion policy, lack of coordination between Transport and Environment Departments. It observes that Courts can act for Public Good and give direction on matters of policy but policy formulation is more complex and involving, and demands transparent and inclusive policy process.

The report painstakingly notes that concerns about noise pollution, environmental degradation or regulation of movement of Rickshaws either within the city or smaller towns is not adequately and effectively monitored by the Punjab government. It makes specific recommendations that policy makers in the Punjab government may find useful and informative.

The report shows that there are stake holders, who have both competing and at times common interests, yet they are unable to evolve consensus on how to influence the policy of the government. In the absence of a credible and effective public transport network in the city of Lahore, Rickshaw provides low cost taxi service to the city population of 8 million. Rickshaw is a vehicle of demand and public need and thus it is important to make it environment friendly.

It is equally important to note that where as there are estimated 80,000 Rickshaws plying in the city of Lahore, it is mind boggling that there are only three inspectors to ensure the inspection of these rickshaws. The Rickshaw drivers do have a

union but it is ineffective, an enterprise which is largely run by private individuals, who complain that police corruption and rise in gasoline / gas price, is making it difficult for them to make ends meet. The report raises concerns about the economic feasibility of 4 stroke CNG rickshaws – a contributory factor that hinders the conversion of 2 stroke to 4 stroke.

The report found that the stake holders' input in policy making was minimal – the driver's union, mechanics, Kharadia, dealers and manufacturers. Therefore, it suggests that for an effective and implementable policy, which has some ownership, stake holders involvement must be part of the policy process.

The report recommends an integrated product quality approach to make a transformation from 2 strokes to 4 stroke Rickshaws. It makes a strong and persuasive case to the Punjab government to adopt a "comprehensive urban transport policy, which includes regulations for all public service as well as personal vehicles." To improve citizen mobility and to decrease environmental pollution an efficient public transport system is urgently needed in Punjab.

The Centre for Pubic Policy and Governance is keen to contribute towards a more deliberative, transparent and participative policy process and it is in this spirit that it aims to produce Occasional Policy Papers, and this report is first of the series. We hope the policy makers, media, civil society advocates and citizens find it informative and its recommendations as actionable policy choices. The CPPG encourages its readers to give us comments and critical feedback to further improve our efforts.

Saeed Shafqat PhD
Professor & Director,
Centre for Public Policy and Governance

June 30, 2009

Executive Summary

The level of environmental pollution in the major cities of Pakistan is approximately three times the safety levels recommended by the World Health Organization (WHO). A primary factor is motor vehicles emissions which account for approximately 60-70% [1] of the total annual emissions in cities. Other than the sheer number of vehicles, it is the average Pakistani vehicle emission which is 20 times the Hydrocarbon, 25 times Carbon Monoxide and 3.6 times Nitrous Oxide in grams per kilometer, compared to an average vehicle in the United States of America that poses the real problem.

Based on Petition No. 6927/997, the Lahore High Court had constituted the Lahore Clean Air Commission which gave its recommendation on 26th May 2005. The Court gave the following judgment based on its recommendations:

1. Phase out existing buses in two years (by December 2007) and replace them with CNG buses conforming to Euro-II standards. Certify conversion of existing buses to CNG through authorized dealers, cap the life of a bus to 10 years and provide dedicated bus lanes in the city.
2. Phase out wagons from city centers, replace them with mini-buses and where required use wagons conforming to Euro-2 standard.
3. Introduce 4-Stroke rickshaws immediately and phase out 2-Stroke rickshaws by December 2007. Strictly enforce the January 2005 registration ban on 2-Stoke rickshaws.
4. Set short & long term Ambient Air Quality, vehicular emission and fuel standards by 2007. The court set the emission and fuel standards [2] for new vehicles.
5. Establish Ambient Air Quality squads and stations by the Lahore District Government within a year. Also make effective measure for inspection and monitoring stations within a year.

For the purposes of this report, points 3-5 have been explored in depth. Among the above mentioned points, the government has made some progress on introducing 4-Stroke rickshaws, has mostly removed wagons from city centers and has established two new Ambient Air Quality stations in the city, while all other points have been completely ignored.

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[1] Exact number is not available but based on readings of busy crossings with high level transport activity, residential areas and industrial areas, EPA has ascertained that 60-70% of total emissions comprises of vehicles.

[2] current fuel: sulfur content: import: 0.5% local: 1% all unleaded gasoline/petrol

To replace 2-Stroke rickshaws with 4-Stroke CNG rickshaws, the Punjab Government started the Chief Minister Green Punjab scheme which provided a subsidy of 23,000 – 29,000 for each 4-Stroke rickshaw. To date, more than Rs 10 million has been spent on this scheme. The government's strategy to replace 2-Stroke rickshaws from five major cities of Punjab included a carrot and stick approach as 2-Stroke rickshaws were restricted from few major arteries of Lahore and a subsidy was given on 4-Stroke rickshaws. The policy initiative was restricted to this with the assumption that market dynamics will facilities the replacement. But even by late 2008, a year past the High Court mandate, about 50,000 2-Stroke rickshaws ply the streets of Lahore as compared to 10,000 4-Stroke rickshaws clearly indicating a need for change in the current policy.

It is actually the market dynamics which have led to a dismal performance of the current policy. Although the government provides a subsidy, the 4-Stroke rickshaw owing to higher spare parts costs (4-Stroke spare parts are imported compared to domestically produced 2-Stroke parts), high maintenance costs (because of low quality product and a lack of trained mechanics) brings an extra income of Rs 610 a month compared to a 2-Stroke rickshaw. If monthly installment is subtracted from this amount, a 4-Stroke rickshaw driver actually makes Rs 3000 less than a paid up 2-Stroke rickshaw driver. The monthly income for a 4-Stroke rickshaw driver after paying the installment comes out to be Rs 3000 which is not a live able wage. It is thus not surprising that loan default rates hover around 20 – 30% for the Government of Punjab scheme and 40-50% for the Federal scheme.
It is thus recommended that the Government of Punjab takes a more proactive approach towards converting 2-Stroke rickshaws to 4-Stroke rickshaws to limit the environmental pollution menace:

- An integrated product quality evaluation should be devised: Currently a federal department, the Pakistan Standards and Quality Control Authority (PSQCA) is responsible for product quality while the Provincial Transport Department is responsible for approving a public service vehicle. In addition, the Motor Vehicle Examiners are on the payroll of the district government while being managed by the province. An integrated quality assurance approach among these departments is necessary to put and keep good quality rickshaws on the road.
- Stakeholder Involvement should be made integral to the program: Initial policy decisions were taken without the consent of the Driver's Union, Mechanics, Khiradia, Dealers which led to a confrontational attitude between the government and the stake holders (other than manufacturers). The success of government's policy can only be achieved by involving all stakeholders and making them a partner in the initiative. The driver's unions and mechanics specifically need to be taken onboard, given incentives and trained to improve the market viability of the 4-Stroke rickshaw.

- Explore alternative policy options: Alternative policy options are available but have not been explored. The government is currently spending Rs 45,000 as actual sub sidy on a 4-Stroke rickshaw. For the same amount, an existing 2-Stroke rickshaw can be converted into a 4-Stroke CNG rickshaw with a fraction of current import costs on new 4-Stroke CNG rickshaws.
- A holistic solution to urban transport with emphasis on Public Transport: There is a need to define a comprehensive urban transport policy which includes regulations for all public service as well as personal vehicles. There is currently no limit on the number of rickshaws in Lahore leading to increase in traffic and a non-live able wage for rickshaw drivers. In addition, an efficient Motor Vehicle Inspection system is required as the current setup with only three Motor Vehicle Examiners for Lahore can never satisfy the testing requirement of a large metropolis. But most importantly an efficient Public Transportation System is required both to improve citizen mobility as well as to decrease environmental pollution. A study indicates that a 5% passenger shift to public transport from personalized can lead to 6.21% reduction in CO_2 emissions in large cities.[3]

The Punjab Government needs to define a comprehensive transport policy for the whole province rather than concentrating on five large cities. Currently 50,000 2-Stroke rickshaws and 15,000 Chandgaris are running illegally in Lahore leading to environmental pollution and a loss of Rs 10 million per year to the government exchequer. A realistic approach which bridges policy, law and ground reality is required to fulfill the mandated requirements of the High Court with out any adverse affect to stake holders especially those in lower income brackets.

Research Methodology

The study assesses government's rickshaw policy with the specific purpose to evaluate the impact of the policy or lack of it on all stake holders in the rickshaw sub-sector. The genesis of the policy had its roots in a High Court petition which evolved into a court order requiring the government to decrease pollution in the city of Lahore.

The research universe thus includes the process leading to the court order; the complete rickshaw sub-sector including manufacturers, assemblers, mechanics, khiradia, spare parts dealers, body makers, painters, customers, owners, drivers and dealers; and

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[3] Sudhir Gota & Bert Fabian, Emissions from India's Intercity and Intracity Road Transport (CAI Asia, May 2009) p2

government departments involved in policy making and enforcement including PSQCA, Environment Protection Agency (EPA) and Department of Transport Punjab.
The research methodology used to gather needed information differed according to the subject concerned. Following is a brief description of the process followed:

- Information regarding legal process was acquired through the court judgment, informal interviews of the petitioner and the representatives of Environment Protection Agency.
- Detailed semi-structured interviews were conducted of personnel in the Environ ment Protection Agency and the PSQCA to understand their departmental involve ment and their personal opinions regarding the execution of the policy.
- Due to change in high level bureaucracy at the Department of Transport, interviews could not be conducted at that secretary level, but information was gathered through government documents, informal interviews of officers at the Regional Transport Authority and Deputy Director level officers. In addition, site visits were undertaken and interviews conducted of Motor Vehicle Examiner at the Badami Bagh vehicle inspection station.
- Site visits and structured interviews of mechanics, dealers, spare parts dealers, khiradias, body makers and painters were conducted at the Lytton road rickshaw market to get sales figures, market prices of parts, labour costs and earning information.
- Detailed interviews of President Rickshaw Dealers Association and President Rickshaw Drivers Unions were conducted.
- Phone interviews were conducted of engineers working on the 4-Stroke converted engine and its sponsor, the Driver's Union in Karachi.
- Site visits of small and large scale manufactures was undertaken along with semi-structured interviews of CEOs and plant managers.
- Survey sampling technique was used to acquire detailed information from rickshaw drivers (equally divided into 2-Stroke & 4-Stroke) at different parts of the city including Anarkali, Gawalmandi, Lytton Road, Kalma Chowk, Thokar Niaz Beg, Chairing Cross Mall Road and Daewoo Bus Station.
- Informal interviews were conducted of customers belonging to varied social classes.
- Official Bank Financing Schemes data was acquired from respective banks (Bank of Punjab, Punjab Provincial Cooperative Bank, Punjab Small Industries Corporation, National Bank of Pakistan). Where official data was not provided, informal information was collected through personal interviews.

Rickshaw and the Environmental Argument

The Environmental Protection Agency (EPA) Lahore's results based on its May 26 – June 6, 2008 testing fail to meet the standards set by World Health Organization (WHO). With an ozone reading of 127.4ug/m3 (microgram's per cubic meter) exceeding the WHO guideline of 100ug/m3, level of sulphur dioxide (SO_2) at 56.40ug/m3 against WHO guideline of 20ug/m3 and the annual level of nitrous oxides (NO2) at 112.50ug/m3 against WHO guideline of 25ug/m3[4], emission levels in Lahore are three times the safety levels set by WHO. Regarding noise pollution, certain sites in Karachi have a noise level of 120 decibels against the 80 to 85 decibels maximum limit for humans. The study also found that 40 % of traffic cops had a high hearing level while 70 per cent of rickshaw drivers (driving for more than 10 years) had partial hearing impairment.[5]

The Lahore High Court in response to a Writ Petition Number 6927 of 1997 had established the Lahore Clean Air Commission in January 2003. The petition by citizens of Lahore had argued that citizen's right to life as guaranteed under Article 9 & 14 of the Constitution of Islamic Republic of Pakistan 1973 had been compromised because of the health hazards (bronchial irritation, heart problems, anemia, asthma, eye irritation) of air pollution. Additionally high noise levels could permanently damage hearing, was a cause of psychological disorders and of variation in blood pressure.

It asserted that motor vehicles emissions account for approximately 60-70% of the total annual emission[6] of Hydrocarbons, Aldehydes, Carbon Monoxide, Carbon Dioxide, Sulphur Dioxide and Nitrogen Oxide.[7] An average Pakistani vehicle emitted 20 times the Hydrocarbon, 25 times Carbon Monoxide and 3.6 times Nitrous Oxide in grams per kilometer, compared to an average vehicle in the United States of America. This ratio was exasperated due to incomplete combustion by 2-Stroke engines (Rickshaws, Motor Cycles, and Scooters) and diesel engines which together comprised a significant part of public transport in Lahore. The petition put the onus on Regional Transport Authority (a part of the Provincial Transport Department), established under the Motor Vehicle Ordinance 1965 for being responsible for enforcing Motor Vehicle Rules 1969.

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4 http://www.dawn.com/2008/06/08/nat34.htm

5 http://www.dawn.com/2005/06/24/local9.htm

6 Exact number is not available but based on readings of busy crossings with high level transport activity, residential areas and industrial areas, EPA has ascertained that 60-70% of total emissions comprises of vehicles.

7 Pakistan National Conservation Strategy conducted in collaboration with the Environmental & Urban Affairs Department and World Conservation Strategy [IUCN], Judgment against Writ Petition No.6927/1997

The Lahore Clean Air Commission finalized its recommendation and submitted them to the court on 26th of May, 2005. The recommendations were sent to all provincial and federal ministries for their feedback and suggestions and by 17th of November, 2005, all ministries had conveyed their respective approval. The Department of Transport, Punjab which had been a part of the commission created a work plan in collusion with Planning and Development Department and the EPA. Government's suggestions and strategy was given to the court through the 29 May, 2006 progress report. The High Court accepted the petition basing its ruling on Pakistan's international[8] and national[9] commitments . The court mandated implementation of the following:

- Phase out existing buses in two years (by December 2007) and replace them with CNG buses conforming to Euro-II standards. Certify conversion of existing buses to CNG through authorized dealers, cap the life of a bus to 10 years and provide dedicated bus lanes in the city.
- Phase out wagons from city centers, replace with mini-buses and where required use wagons conforming to Euro-2 standard

: Table 01 Emission & Fuel Standards Mandated by the Lahore High Court

Vehicle Category	1-7-2007	1-7-2010	
3-Wheel	Euro-IIi or 4-Stroke CNG	Euro-III	
Vehicle Category	**1-7-2008**	**1-7-2010**	**1-7-2013**
Cars	Euro-II	Euro-III	Euro-IV
2-Wheel	Euro-II	Euro-III	
Vehicle Category	**1-7-2006**	**1-7-2010**	
LCV (Wagons)	Euro-II	Euro-III	
HDV (buses)	Euro–II	Euro-III	

8 Pakistan is signatory to 1985 Vienna Convention on Protection of Ozone Layer, 1992 United Nations Framework Convention on Climates Change - UNFCCC and the 1990 International Oil Pollution Preparedness, Response and Cooperation

9 Pakistan Environmental Protection Act - Act XXXIV of 1979, Article 9 & 14 of the constitution and prior superior court rulings

10 current fuel: sulfur content: import: 0.5% local: 1% all unleaded gasoline/petrol

- Introduce 4-Stroke rickshaws immediately and phase out 2-Stroke rickshaws by December 2007. Strictly enforce the January 2005 registration ban on 2-Stoke rick shaws (auto and motorcycle).
- Set short & long term Ambient Air Quality, vehicular emission and fuel standards by 2007. The court set the emission and fuel standards[10] for new vehicles.
- Establish Ambient Air Quality squads and stations by the Lahore District Government within a year. Also make effective measure for inspection and monitoring stations within a year.

Thus the court accepted most of the recommendations of the Lahore Clean Air Commission with an enforcement lag of one year as the commission had recommended changes by end of 2006. Following are a few overlooked recommendations:

- Nominate dedicated stations for procurement of pre-mix (petrol & oil) for existing 2-Stroke rickshaws.
- Require all imported Complete Built up Units (CBU) to comply with Euro-II standards.
- Set standards for pollutants (PM 10; PM 2.5; CO; Ozone(03); SO_2; NO_x; Lead) by 2006 though the court had set standards schedule for new vehicles.
- Privatize vehicular emission monitoring stations by January 2006.
- Enhancing Air Quality Management courses in universities and train the police, transport and urban planning departments to its importance.

The High Court also rejected two petitions; one claiming that market collusion between government department and a manufacturer and other arguing that the 2-Stroke rickshaw ban would affect the poor rickshaw driver's livelihood. The Court found no grounds of collusion and was satisfied with the Government's undertaking to use its Green Fund to encourage poor and deserving candidates to buy 4-Stroke rickshaws, while giving preference to the affected – the 2-Stroke rickshaw drivers. Another suggestion of converting 2-Stroke into 4-Stroke CNG Rickshaws was declined by the Department of Transport due to want of effective technology.

Regulatory Framework

The regulatory framework applies to the rickshaw in at least three stages. The first stage is the manufacturing of the rickshaw, the second its introduction into the market and the third its management on the roads.

For industry and product manufacturing, Engineering Development Board (EDB) and Pakistan Standards and Quality Control Authority (PSQCA) are the two main regula-

tory bodies. EDB is responsible for approving the facility and import features of the manufacturer while the PSQCA is responsible for auditing the quality of manufacturing and post-manufacturing process, raw materials, semi-finished product and the finished product. In addition, PSQCA validates requirements of qualified and trained man power and issues a certificate for at least 1 year. In addition, the PSQCA is mandated to visit the facility four times a year, costing the manufacturer Rs 5,000 a visit. Rickshaws fall under the three wheelers PSQCA Standard 4708, which has fifty one requirements including noise and air quality standards.
The Department of Transport Punjab is responsible for giving a 'Public Service Vehicle' certificate to a product. The process includes receiving a certificate of approval from the PSQCA, following which, a technical team comprising of the Environment Protection Agency (EPA) and the Transport Department visits the factory to ensure technical specifications and environmental standards. This team reports to the technical committee comprising of Provincial Transport Authority, EPA and Traffic Police.

Once the product is approved as a Public Service Vehicle, The Department of Transport associated department, the Punjab Provincial Transport Authority is then responsible for managing 'Public Service Vehicles' based on the Motor Vehicle Ordinance 1965 and Motor Vehicle Rules 1969.

The regulatory mechanism for the rickshaw is the following:

- The motor vehicle examiner (MVE) has to approve the vehicle before it can be registered by the Excise and Taxation department.
- Registration: Each new rickshaw has to be registered with the Excise and Taxation Department, Punjab.
- Token: Token is a sort of road tax collected by the Excise and Taxation Department amounting to Rs 360 a year.
- Route Permit: Each rickshaw as a public service vehicle has to get a route permit for a particular city (for buses, route within a city) from the District Regional Transport Authority (A local government department). The route permit costs Rs 1050 for three years.
- Fitness (Passing in rickshaw community's language): Each rickshaw as public service vehicle has to pass a fitness test every six months costing Rs 250 a year. The test is conducted by the Motor Vehicle Examiner who is paid by the District Government but is managed by the Provincial Transport Department.

Government's Initiative

Background

The EPA ran various campaigns on the rickshaw issue from 1997 – 2003. Few campaigns used a three pronged approach where as a first step the driver was warned about their pollution emitting vehicle, second step involved penalizing (challan) the driver while in the last step of the campaign, rickshaws were impounded. In 2000, the EPA impounded about 200 rickshaws.

EPA considered that the main reason for pollution of the 2-Stroke rickshaw was the excessive use of oil. According to an experienced manufacturer, 1.5% of oil in comparison to petrol should be sufficient for engine lubrication but the drivers used more than 2%. The EPA conducted practical tests when the drivers were not satisfied with the suggestion. Two rickshaws were driven around town, one with a proper silencer using 1.5% oil while the other was as normally driven. The test results indicated that the rickshaw using 1.5% oil worked just fine and had less cost, emissions and noise compared to the normal rickshaw. The primary reason for the use of more oil was easier maintenance and inexpensiveness because of the availability of substandard oil in the market. But even with the ideal use of oil and silencer, the 2-Stroke rickshaw barely makes the 4.5% CO_2 requirement, the noise requirement of 85 decibels and but does not suffice the hydrocarbon limit.

In 2001, the EPA used foreign expertise to convert twenty 2-Stroke rickshaws to CNG with foreign assistance but the program could not be extended because of a lack of supporting infrastructure, know how of the mechanic community and most importantly because the cost of CNG conversion at Rs 30,000 was impractical as compared to Rs 4,000 for LPG.

Over the years, a number of experiments have been undertaken towards getting rid of the 2-Stroke rickshaw pollution. This includes civil society supported efforts to replace the 2-stroke rickshaw engine with a 500-cc imported junk engine[11], creating a new silencer[12] and EPA supported CNG conversion of 2-stroke rickshaws in Peshawar leading to net decrease in pollution by 1.95%[13].

The first environmental standards (The National Environmental Quality Standards) were set in 1993 based on the recommendations of the Pakistan Environmental Protection Council (PEPC) and included CO levels for petrol and Smoke Density (Particular Matter - PM) for diesel. The EPA had set the following environmental requirements in 1997 based on the same recommendations.

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11 http://www.dawn.com/2005/11/01/nat28.htm
12 http://www.dawn.com/2002/04/09/local11.htm
13 http://www.dawn.com/2004/10/19/local28.htm

- Smoke: 40% or 2 on Ringllemann Scale at a distance of 6 meters or more
- Carbon Monoxide: 4.5% for new and 6% for used vehicles
- Noise: 85 dB with sound meter at 7.5 meter from the source

According to the tests conducted by the EPA as listed in the table below, the 4-Stroke engine showed much better results than the 2-Stroke engine while the CNG is considered the cleanest fuel of Petrol, LPG and CNG. According to the EPA, the LPG fueled vehicles produce a lot more hydrocarbons than even the Petrol vehicles though concrete test results are unavailable.

: Table 02 Engine and Fuel Emissions Comparison

	CO (%)	Hydro Carbon (ppm)
2-Stroke Engine on Petrol	7.8	17,227
4-Stroke Engine on Petrol	3.8	462
2-Stroke Engine on CNG	0.82	1,733
2-Stroke Engine on LPG	4.02	9,250
4-Stroke Engine on CNG		

The government (PSQCA & Department of Transport) had initiated a dialog with the 2-Stroke rickshaw manufacturers to convert their production from 2-Stroke to 4-Stroke. The PSQCA had given a three year deadline to the rickshaw manufacturers back in 2001. As the deadline approached, the manufacturers asked for an extension but were not entertained and though the Punjab Government couldn't ban the manufacturing of 2-Stroke rickshaws as that fell in the purview of the federal government, it stopped 2-Stroke rickshaws registration starting 1st January 2005.

Commission Initiated Changes

Taking notice of the recommendations of the Lahore Clean Air Commission, the Punjab Government asked the court to grant them time till December 2007, when an alternative could replace all 2-Stroke rickshaws from the five largest cities of Punjab (Lahore, Multan, Faisalabad, Rawalpindi and Gujranwala).
The government's plan envisaged producing 100,000 4-Stroke rickshaws in three years to be able to remove both the 2-Stroke rickshaws (auto and motorcycle rickshaw – Chandgari).[14] The 4-Stroke rickshaw was introduced in 2006 with the result that four

manufacturers had their product in the market by the time Court rendered its decsion.
The Chief Minister Green Fund scheme was introduced to subsidize leasing/financing of 4-Stroke CNG rickshaws through provincial government's financial institutions.
As 4-Stroke rickshaws made it to the roads, the government gradually closed main city arteries to 2-Stroke rickshaws, with the plan to eventually remove them from major cities. The Mall Road, Lahore was closed to 2-Stroke rickshaws on 17 April, 2006 leading to a protest by Rickshaw Drivers Union. The protest led to the arrest of about 72 rickshaw drivers, some under the charges of terrorism and incarcerated for 3 months.

Additionally 2-Stroke rickshaw was also banned from GOR1, Cantonment and Defense Housing Authority (DHA) later extending to Jail Road. In the next phase, the government's plan is to ban 2-Stroke rickshaws on the Main Boulevard between Siddique Plaza and Liberty Market and the Feroz pur Road effectively relegating 2-Stroke rickshaw to the city outskirts. The excess 2-Stroke rickshaws would move to smaller cities and rural areas replaced with 4-Stroke rickshaws in the long term.
The Chief Minister Green Punjab Scheme started in May 2006 by the Government of Punjab (GoP). Its purpose was to subsidize the financing of 4-stroke rickshaws to improve the environment. The government negotiated with the manufacturers and fixed the price of rickshaw under the scheme at Rs. 125,000 without GST. It has since changed. The initial budget for Punjab Government's environmental initiatives under which the finance program was run was more than Rs 1 billion over a five year period. The government started the scheme with three financial institutions. For the Punjab Small Industries Corporation (PSIC), the government provided an upfront subsidy of 20,000 on the down payment and the customer paid 5.5% markup on the loan. For Punjab Provincial Cooperative Bank (PPCB), two schemes were available: the upfront subsidy of 20,000 or the markup was paid by the government. For the Bank of Punjab (BoP), the government paid the markup interest.
Given that Pakistan Investment 3-yr Bond market markup has moved from 10% to 14% since 2006, by using 12% as the average discount rate, it can be assessed that the average government subsidy per rickshaw is from Rs. 23,418 – Rs 29,724 for the Chief Minister Green Punjab program. In addition the customer also receives a subsidy because the scheme's rickshaw price is lower than the market price. The average installment is Rs. 3,692 which comes out to be Rs. 142 a day, equivalent to the Rs 150/day rent paid by 2-Stroke drivers to the rickshaw owner. The down payment cost for PSIC and PPCB is low at Rs. 25,000 while for BoP, its Rs. 45,000.

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14 Amir Butt, *"2-Stroke Rickshaws: Government restriction and opinion of the Affected"* Urban Forum (Lahore: Punjab Urban Resource Center, 2008) p6

The details of the schemes are as follows[15]:

: Table 03 Government Financing Schemes

	Chief Minister Clean Punjab Scheme			President Rozgar Scheme
	Punjab Small Industries Corporation (PSIC)	Punjab Provincial Cooperative Bank (PPCB)	Bank of Punjab	National Bank of Pakistan (NBP)
Cost Of Rickshaw	Fixed by GoP Rs. 146,250 (with GST & Excise Duty)	Fixed by GoP Rs. 143,750 (with GST)	Fixed By GoP Rs. 145,000 (with GST)	Market Price
Collateral Requirements	Should be > Grade 8 Govt. Officer or a Business owner who has paid last 3 year taxes			2 references with ID Cards and a PTCL Number
Government Subsidy	20,000 paid upfront	20,000 paid upfront / All Markup paid	All Markup paid	Half of Markup paid
Down Payment as % of Equity	25% 20,000 Paid By GoP	25%	25%	10%
Markup	5.5%	5.5% with up-front subsidy 16.10% without	16.10% Reducing Balance Method Paid By Government	= Kibor + 2% = 12% 6% paid By Govt. 6% by customer
No of Installments	3 years	3 years	3 years	5 years
Monthly Installment	3,917	3,564	3,595	
Sum of Installment Amount	140,265	122,903	123,971	
Total Insurance Amount	13,212	18,504	18,665	2.8% of rickshaw price
Total Makeup	18,099	26,760	26,993	
Down Payment				
Equity	36,563	35,938	36,250	

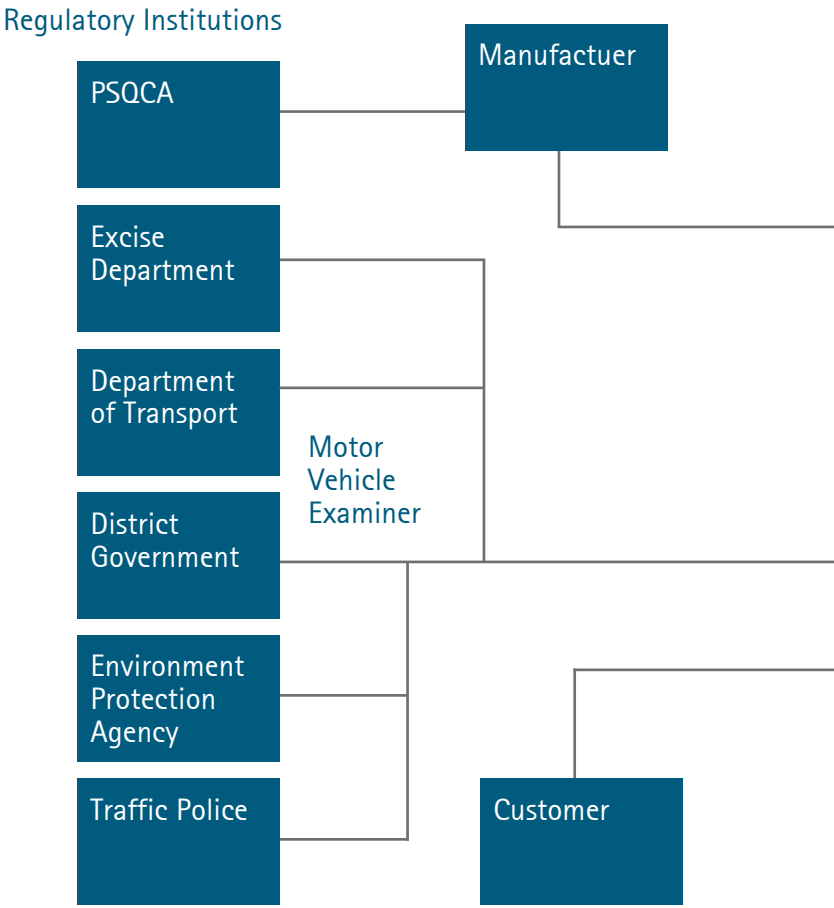
[15] The objective of the provincial versus the federal scheme was different. While the federal scheme was about *employment generation* which included rickshaws as one of the much larger array of products including computers, the provincial scheme was about *environmental protection*.

: *Table 03 continuing from left page*

	Chief Minister Clean Punjab Scheme			President Rozgar Scheme
	Punjab Small Industries Corporation (PSIC)	Punjab Provincial Cooperative Bank (PPCB)	Bank of Punjab	National Bank of Pakistan (NBP)
Bank: Application, Verification & Processing Fee	672	1,500	1,500	1500
Documentation Charges	0	500	500	400
6 month Insurance	2mth Insurance: 734	3,414	3,444	1 yr insurance amount
First Month Installment	0	3,564	3,595	After 3 months
Government Subsidy	20,000	0	0	
Total Down Payment	17,656	44,915	45,289	Depending on Price
Registration Cost	4,500	Paid By Customer	Paid By Customer	Paid By Customer
Actual Government Subsidy	20,000 upfront & 10.6% markup (16.10% - 5.5%)	20,000 upfront & 10.6% markup OR 16.10% markup	16.10% markup	
Subsidy Per Rickshaw (Present Value @ Discount Rate of 12%)	29,724	No markup- 23,418 Upfront - 29,724	23,418	

The federal government had instead started an employment generation program, The President Rozgar Scheme though the National Bank of Pakistan (NBP) which started in September 2006 and included a 4-Stroke rickshaw financing component. Qingqi, a Chinese company was the sole 4-Stroke rickshaw manufacturer in the program for the first six months before other companies were added. The scheme requirements included age between 18-45 years, two references with ID cards, a PTCL number (land line number) and a driver's license. The customer was required to pay 10% as down payment while the markup was 12%, half of which was paid by the government and the rest by the customer in 57 installments starting after three months. Additionally life insurance was paid by the government while vehicle insurance was the responsibility of the customer.

The Rickshaw Sub-sector



Dealers' Union

Banks & Financial Institutions

Dealer

Drivers' Union

Owner

Driver

Khiradia

Mechanic

Painter

Body Maker

Spare Parts Dealer

There are around 60,000 rickshaws on the roads of Lahore according to the Excise and Taxation department's registration list. It is not possible to find the exact figure as all are not registered. Because 2-Stroke rickshaws could not be registered starting 2005, the maximum number of 4-Stroke rickshaws would be 13,728 though this number also includes the Chandgari which were banned in late 2005. Thus rounding the figure, it can be estimated that there are around 50,000 2-Stroke rickshaws in Lahore.

: Table 04 Registration of Rickshawa & Chandgari in Lahore

Year	Registered
2003	4,907
2004	10,933
2005	5,240
2006	756
2007	4,294
2008 (Till July)	3,438
Total Rickshaws	~60,000

2-Stroke Rickshaw

The 2-Stroke rickshaw has an Air Cooled engine, an old technology. The 2-Stroke Vespa entered the market in 1990 and over a period of four years it was copied and indigenized by the domestic manufacturers. Only the Head Piston, Cylinder, Barring and Carburetor are now imported from China which make up about 5% of the total cost as every thing else is locally made. The maintenance cost is also low as there are plenty of knowledgeable mechanics in the market, the spare parts are cheap and locally made while before the introduction of 4-Stroke, the resale value used to be high.
A significant reason for pollution is the use of low quality oil (recycled oil makes it way back into the market because of a lack of efficient regulation) which costs only 75% or less of regular mobile oil. Low quality oil costs Rs 100/ltr while the regular oil price is Rs 150/ltr. Mechanics argue that if good quality mobile oil is used, speed restricted to 35km/hour and proper silencer is installed, the pollution issue can for the most part be tackled. A more interesting aspect is that maintenance charges can be halved to about Rs 600 a month rather than Rs 1100/month if good quality mobile oil is used. Thus from a purely economic perspective, a driver does not gain from using low quality mobile oil, but the habit of immediate saving for a low earning individual over powers such budgetary aspects.

: Table 05 Manufacturer Market Leaders

2-Stroke		4-Stroke	
Vespa, MRC	15,245	Sazgar	3,895
Pak Hero, Tezgam	12,354	Qingqi	844
Super Star, AITM	5,830	Master	460
Start Asia	3,522	New Asia	347
Pak Hero	3,413	Mini Cab	303
Tiger	3,214	Pak Hero	236
Suzuki, Shogun	3,161	Rozgar	213
Qingqi, KWM 100	1,816	Road Prince	135
Burraque	1,238	Eagle	100
King Hero	1,142	Road King	46

4-Stroke Rickshaw

The 4-Stroke rickshaw has a water cooled engine which is similar to motorcycle and car engine technology. It is too early to estimate the average life of a 4-Stroke rickshaw but overall it has not performed well in the market and is perceived to have high maintenance costs. Some drivers argue that it is dependent on the driving style and how much one takes care of the rickshaw. The majority of 2-Stroke rickshaw drivers who were used to good acceleration, fast running, driving on various surfaces and self maintenance of their rickshaw are not happy with their 4-stroke rickshaw also because it is unfamiliar and untested.

The 4-Stroke technology has either been imported from China or India and manufacturers argue that they have already achieved 70% import deletion because of the maturity of the rickshaw vendor industry. Most manufacturers are using Chinese engines primarily because of import restrictions with India. Those who use Indian technology and spare parts argue that it is much better quality and also cheaper but the trade route through Dubai add unnecessary costs. Thus far only some rubber and plastic spare parts have been indigenized leading to up to 40% cost reduction but the quality of these parts is considered even worse than most Chinese parts.

Manufacturers & Assemblers

Over the last four years, about 40 manufacturers have been registered with the Department of Transport, Punjab increasing the manufacturing capacity of 4-Stroke rickshaws. These include both new manufacturers as well as older 2-Stroke rickshaw manufacturers who have changed their rickshaws to fulfill requirements set by the transport department. Thus overall there has been investment in the sector. But with such a large number of companies in the market, competition and consolidation is bound to leave only a few companies in the coming years. Even the competitive advantage of the industry is not yet defined as companies who were earlier in the 2-Stroke market consider the competitive advantage to be price while some new 4-stroke companies believe it to be quality.

: Table 06 List of Few 4-Stroke Manufacturers

Make	Manufactured 2-Stroke	Market Price
Star Asia	Y	120,000
Tezgam	Y	130,000
Pak Tower		130,000
Tiger	Y	145,000
Pak Hero	Y	150,000
Master		150,000
Qingqi		155,000
Commando		155,000
Eagle		160,000
Super Power	Y	160,000
Rozgar		160,000
Sazgar		167,000
Light Rickshaw		207,000

A Rs. 40million investment employs about 250 workers including laborers, mechanics, body makers, painters, electricians, administrative staff and engineers with the capacity to produce about 30 rickshaws daily. Thus according to a rough estimate, monthly production of 3-3.5 rickshaws creates a single job in the sector. Manufacturers argue that only the engine which is about 30% of the cost is being imported while most other parts are being domestically manufactured. Thus from an import standpoint, the rickshaw industry has moved from a 95% indigenization to 70% or less.

There is a need for further market study as preliminary research estimate a large market for 4-Stroke CNG rickshaws. On average the manufacturing companies perceive 20,000 units a year market as one large manufacturer is also eyeing the exports markets of Sri-Lanka, Bangladesh and Africa. But the current market slum due to economic downturn and the stoppage of NBP and BoP loan schemes has led to a decrease in demand. Thus manufacturers are currently operating on a 15% capacity. Manufacturer with maximum capacity of 30 units a day is producing 2-3 units while large manufacturers have cut down from 1500 units/month to 200.

A large manufacturer argues that it took them two years to develop the rickshaw as imported engine and design required changes to climatically align it with regional realities. Manufacturers have also created a 3S (Sales, Spares & Services), 2S and 1S network to support their customers. But bad quality leading to high default rates, especially of some vendors has given a bad repute to all 4-Stroke rickshaws. Some blame it on the lack of quality verifiability of the Chinese engine. It is thus up to the manufacturing companies to satisfy their customers by providing good customer service to remove complaints of a lack of accessibility of mechanics, wear and tear and high maintenance costs. But accessibility of spare parts is limited to certain sections of the city making it harder and costlier to get vehicles fixed. According to the drivers, the largest 4-Stroke CNG company only has one maintenance centre in Lahore.

Financing is the life line of the automobile industry but the government subsidy had distorted the market leading to the entry of additional players. No other incentive (import, export or manufacturing) exists for the industry. A large manufacturer suggests that it is willing to buy back recovered vehicles due to loan default to decrease the risk to financial institutions, as it is important to get private financial institutions to enter the market even if they charge commercial rates. This is particularly the point of view of manufacturers who consider quality as their competitive advantage.

The debate between subsidizing the new 4-Stroke CNG rickshaw versus letting market forces determine availability is based on the following elements:

- Because of government subsidy scheme, an exceeding number of manufacturers (40 registered with Government of Punjab) entered the market. Though this initially led to job generation, a market consolidation is foreseen. Subsidy along with 2-Stroke

rickshaw ban enhanced the time to market factor leading some manufacturers to compromise on quality. But the subsidy and lax collateral requirements did allow poorer segments of society to buy a rickshaw.

- Market determination with out a subsidy would not have rushed a large number of rickshaws to the market in the short term. In addition, better quality guarantees by manufacturers to commercial financial institutions would have limited the loan default rate but with stringent collateral requirements, few drivers would have been able to buy the rickshaw.

Mechanic and the Khiradia (Part Maker)

The mechanic and the Khiradia work in tandem. Due to complete indigenization of the 2-Stroke rickshaw with few imported parts, the Khiradia provides a specific part of the engine or otherwise as required by the mechanic. One can describe Khiradia as the part maker equipped with metal manipulation machinery. An estimate of the number of Khiradias in Lahore would be around 700 as there are 40 shops employing 80 Khiradias just on Lytton road. In addition other nodal points of rickshaws include Bund Road and Qainchi / Koth Lakhpat though mechanics are interspersed across the city landscape .This group does not yet feel threatened because 2-Stroke rickshaws are still plying the roads though the affect on the business will depend on indigenization of the 4-stroke rickshaw. Khiradias feel that they would need at least six months to get up to speed for the 4-Stroke rickshaw.

The 2-Stroke mechanic though is as affected as the rickshaw driver. It is estimated that 4,000 2-Stroke rickshaw mechanics work in Lahore. A large percentage works on the engine which has a completely different technology from the 4-Stroke water cooled engine. Actually, the motorcycle or car mechanic is more attuned to 4-Stroke engine than the existing 2-Stroke mechanic. Although manufacturers have trained mechanics, most work in manufacturer facilities and service centers and there is a dearth of trained 4-Stroke mechanics in the market. This lack of trained mechanics is an important reason for the loss of credibility of 4-Stroke rickshaws.

The mechanics, khiradia, body makers, painters do not have their professional union and are represented in the shop owners union of their specific location. This limits the representation of their interest even in the policies that impact them.

Spare Parts Dealers, Body Makers & Painters

Currently a single shop sells spare parts for all 2-Stroke rickshaws while for 4-Stroke, a specific company has its own dealer as spare parts of one 4-Stroke company differ from

the other. Additionally, there may be different engine models even for the same company requiring different part needs. Thus a 4-Stroke driver requires more know how than the 2-Stroke driver. It is likely that the gradual shift to 4-Stroke will also move the 2-Stroke dealers to a specific 4-Stroke company or common parts as indigenization takes place.

There are about fifty body makers and a dozen painters who will not be affected by the 4-Stroke engine as their skills will also be required for it. Initially the body makers will lose some business as most 4-Stroke engines come with a body but their skills will be required for maintenance as well as the peculiar decoration done by rickshaw drivers.

Customer

There is a general perception that customers prefer a 4-Stroke rickshaw because all roads are open to it but also because it is more comfortable and spacious than the 2-Stroke rickshaw. It is easier for 4-Stroke rickshaws to acquire a customer than the 2-Stroke rickshaws and examples can now be found where 2-Stroke drivers lower their fares compared to 4-Stroke drivers to entice a customer. The main concern for customers preferring 4-Stroke are lack of noise, comfort ability of seats, lower level allowing arthritis patients, women and senior citizens easier access and less chance of getting their clothes torn off by nails or older seats.

Owner & Driver

There are around 60,000 rickshaws running in Lahore with same number of drivers or more. The drivers can be categorized into owner-driver - those who own their own rickshaw and contract-driver - those who drive for a daily rent of Rs 150 for the 2-Stroke rickshaw and Rs 200-250 for the 4-Stroke rickshaw. None of the drivers surveyed shared the rickshaw with another driver but in certain cases a rickshaw is rented for 12 hours leading to two different drivers plying the same rickshaw.
Though no exact figure is available, opinions vary on the concentration of ownership. A respectable figure is that 60% of the rickshaws are driven by contract drivers while 40% are driven by the owner-driver. Opinions vary in this regards from 40% to government officials' figure of 80%. Our survey indicates that that 80% of the 2-Stroke rickshaws in the main city area (GawalMundi, Anarkali etc.) are plied by contract drivers on a daily wage while the same figure is 20% for suburbs (Kalma Chowk, Thokar Niaz Baig). According to survey results, about 90% of 4-Stroke rickshaws are driven by the owner-driver.

Government officials' perceive the rickshaw drivers union to represent only the interests of large owners. Though further research is required to define the exact concentration of ownership, informal research indicates that there are 3-4 large groups who own about 300-400 rickshaws each, a few groups own 30-40 rickshaws but majority ownership is limited to few rickshaws (3-6) per party. The owners include drivers who have bought rickshaws over the years, spare parts dealers and rickshaw dealers.

The contract driver can either have a daily or a monthly contract with the owner. Maintenance responsibility is divided among the contract-driver and owner with the contract-driver responsible for minor day to day maintenance issues while all major maintenance is the responsibility of the owner.

The real income of the rickshaw driver has decreased over the last five years. One reason was the increase in petrol and gas prices since the beginning of the year. The increased gas prices took the rickshaw outside the reach of many customers who instead use the Chandgari (Qingqi), bus or walk. Another reason is the unchecked increase of rickshaws over the years. According to the Environment Protection Agency, Lahore needs only 30,000 rickshaws compared to the 60,000 plus currently on the roads[16]. This not just leads to environmental concerns but also an unlivable wage for all drivers because of a supply glut.

Over the course of this study, forty drivers were surveyed in different parts of Lahore with an even breakdown between 2-Stroke and 4-Stroke. Our survey though not a representative sample provides a few differences between the 2-Stroke and 4-Stroke rickshaw drivers.

Among the 4-Stroke rickshaw drivers about 50% had shifted from 2-stroke rickshaws while the others were either government employees supplementing their income or new drivers. The average working day for surveyed rickshaw driver is 10 hours, pulled down by those only supplementing their income through this trade. The full time rickshaw drivers (75% overall and 82% of the 2-Stroke drivers) work upwards of 14 hours a day to earn a living. Most drivers had a target for the day and went home after it was achieved. The differentiating factors among 4-Stroke and 2-Stroke drivers' highlight that the 4-Stroke driver is financially better off than their counterparts as they worked almost an hour less, 30% of them used this trade to supplement their income compared to 18% of the 2-Stroke drivers and they had smaller number of dependents.

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16 According to the Punjab Urban Resource Centre (PURC) researcher, there are actually upwards of 80,000 rickshaws in Lahore

: Table 07 General Information Comparison Between 2-Stroke & 4-Stroke Rickshaw Drivers

	2-Stroke	4-Stroke
Average Working Day	10.4 hours	9.7 hours
Work < 8 hours/day – supplementing income	18 %	29 %
Number of Dependents	6	4.5
Owner's Information		
Daily Revenue (Rs)	642	665
Daily Earning	352	440
Oil Filter Cost (Per Month)	547	1,086
Parts & Maintenance (Per Month)	993	2,131
Monthly Income (26 working days)	7,625	8,234
Monthly On Job Food Costs (Rs. 65 per day)	1,690	1,690
Monthly Take Home	5,935	6,544
Daily Driver Rent (non-owner)	150	200 - 250

The results show that the monthly take home income of the 4-Stroke rickshaw driver owner is barely Rs 600 higher than the 2-Stroke driver. After paying the monthly installment, it will be around Rs 3,000 a month, a non-live able income for the head of household of 5.5 members. Thus it is no surprise that 4-Stroke rickshaw drivers complain of the high spare parts and monthly maintenance costs. The non-owner driver makes Rs 150 – 300 a day with an average of Rs 200 after paying his daily rent.

The sector is not well organized and according to our survey only 17% of the drivers are members of the union against the main Driver union's claims to represent about 20,000 members (33% of rickshaw drivers). One reason is that the drivers are made up of both Punjabis and Pathans and because the current president of the rickshaw driver's union is an ethnic Pathan, Pathan drivers are much more organized. Still the union was effective in protesting against the closing of the Mall Road for 2-Stroke rickshaws and also fended for the families of the incarcerated.

Though the education level of the drivers was not ascertained, it is an accepted fact that older rickshaw drivers are not literate and thus can not understand the directions for 4-Stroke rickshaw maintenance. Though some manufacturers blame rickshaw driving for high maintenance needs, no one has tried to extend driving and maintenance lessons to the drivers.

Dealers

The dealers sell both new and second hand rickshaws at a lump sum price or in installments. During the last regime, there was a split in the Dealer's Union based on political affiliation. The Anjuman-e-Tajran Auto Rickshaw Dealers is now the main representative body since the formation of the new government and has about 150 members.
Initially factories were not allowed to give rickshaws to dealers as government provided subsidy through the bank schemes. Thus dealers entered the 4-Stroke rickshaw market only in mid 2007. This compounded with the ban on 2-stroke rickshaw, and underperformance of 4-Stroke rickshaws has led dealers to instead invest in the stock market to earn a living.

Review and Analysis of Government's Policy

In the year 2006, the Punjab Government allocated Rs 1,143 million to be spent on environmental programs. The government's solution to the environmental emissions caused by rickshaws was to subsidize the 4-Stroke rickshaw and gradually close city roads to the existing 2-Stroke rickshaw. Thus economic incentives and business restrictions were thought to be the main ingredients to help the transition from 2-Stroke to 4-Stroke rickshaws. Though the government had given enough time to the original manufacturers to convert to 4-Stroke engine technology and subsidized financing schemes to provide an opportunity for rickshaw drivers to move to a higher revenue generation option (as advertised by 4-Stroke rickshaw companies), the success of the policy depended on the returns on investment of the 4-Stroke rickshaw for the rickshaw drivers.
After 2-Stroke rickshaws could not be registered starting 2005, 4-Stroke rickshaw entered the market in 2006 helped by the government's subsidized financing programs. According to government's plans, after a few thousand 4-Stroke rickshaws were on the streets of Lahore, the 2-Stroke rickshaw was banned from the Mall Road, Cantonment and the DHA. Though the Rickshaw Driver's union agitated, they are clamped down upon and about seventy members were incarcerated, for up to three months.
The High Court had earlier dismissed a petition by the rickshaw drivers which argued that they would lose their earning because of the banning of 2-Stroke rickshaws on the

condition that the Government would ensure that existing 2-Stroke drivers were given preference in financing the 4-Stroke rickshaw.
It appears that for a successful transition from 2-Stroke to 4-Stroke, the government had only concentrated on subsidized financing schemes with little or no attention to regulatory mechanisms, quality of the product, engaging and facilitating sections of the rickshaw sub-sector to smoothly go through the transition. Other than the financing schemes, the rest was left to the market forces.

Financing Schemes

Our study reveals that the main hurdle to the plan came from the quality of 4-Stroke rickshaws. The 4-Stroke rickshaw failed to provide a better livelihood to the rickshaw driver because of high maintenance charges. Though all vendors had provided a three month warranty on their rickshaws, bad product quality, high spare parts prices and lack of trained mechanics all contributed towards loan default as drivers could not save enough to pay their monthly installment.

: Table 08 Spare Parts Cost Comparison

	2-stroke / Converted	4-stroke
Clutch Plate	25	300 – 500
Ring	125 parts + 50 labour	250 parts + 200 labour
Engine Oil	50	190
Break Oil	10	90
Wire Clutch Cable	5	70
Back Light Cover	10	50

The President Rozgar Scheme run by the NBP stopped financing Master and Qingqi 4-Strock rickshaws because there loan defaults range higher than 90%, while makes such as Sazgar had a six month waiting period because of excessive demand. It must be mentioned here that while Qingqi was the sole supplier for the NBP scheme for the first six months, the Punjab Government had not included Qingqi in their scheme. Unoffi-cially, the NBP puts their default rate at more than 50% though no rickshaws have yet been repossessed. A total of 7,428 loans (4-Stroke rickshaws & Chandgaris) equaling an equity amount of Rs. 885,531,207 have been extended in Lahore. The price of the rick-

shaw was not fixed and thus the government subsidy varies for every contract. For comparative analysis, if the price of rickshaw was Rs 145,000, then the government subsidy at 12% discount rate[17] would be Rs 16,631 per rickshaw. But given that the NBP is a state owned bank, the actual cost to the Federal Government owing to the 45% loan default rate is Rs 75,000 per rickshaw. The main reason for the high loan default rate of the NBP was due to the selection of the product, the lack of collateral requirement as only PTCL phone numbers & ID cards were required and also because the first installment was due after three months rather than the first month.

The Chief Minister's Green Punjab scheme is being conducted through the PSIC, BoP and PPCB. The following table gives details on the workings of the loan scheme in each institution. PSIC only extended the upfront subsidy scheme; the PPCB provided both upfront as well as no markup scheme with 80% of the loans given under the no markup scheme; BoP provided the no markup scheme. A total of 1,836 rickshaws have been

: Table 09 Real Government Costs of Financing 4-Stroke Rickshaws

	Government of Punjab			Federal Government
	BoP	PSIC	PPCB	NBP
Subsidy per Rickshaw	23,882	29,725	24,466	
No. of Rickshaws loaned	312	1,348	176	7,428
Bank Loan Default % (unofficial)	20-30%	15-25%	15-20%	40 - 50%
Actual Subsidy (including loan default costs)	23,882	51,662	24,466	
Actual Outlays of Punjab Government thus far	Rs 5.95million	Rs. 2.82million (712 rickshaw)	Rs 1.75million	

17 The Discount Rate used is the average of the 3-yr Pakistan Investment Bond from 2006 to 2008. The rate in 2006 was around 10% while the current rate is hovering around 14%.

loaned in Lahore under the Chief Minister's Green Punjab scheme and an amount of Rs 10.52million has so far been provided by the Government of Punjab to these institutions.

For each of the schemes, the government subsidy amount per rickshaw has been calculated using 12% as the Discount Rate[18] (Cost of Capital to the Government of Punjab). Using this discount rate, the government subsidy for BoP, PSIC (upfront subsidy & subsidized markup of 5.5%), and PPCB (10% upfront & 90% no markup schemes) comes out to Rs 23,882, Rs. 29,725, and Rs 24,466 per rickshaw respectively. But this government cost (government subsidy) does not include the cost of loan defaults which hover from 15% - 25%. We have not received the actual official default rates from the institutions but informally officials provided an approximate percentage. By including the cost of the loan default rate (20%), the actual cost per rickshaw to the Punjab Government though he PSIC comes out to Rs 51,662.

Thus the actual cost to the government is almost equally divided into the actual cost of subsidy and the cost of loan defaults. By fixing the price for all manufacturers through the scheme, the Punjab Government brought the rickshaw within the reach of the customers but at the same time led the manufacturers to compete on price rather than on quality. One quality conscious manufacturer even stopped supplying its rickshaws through the scheme. But more important is the need to improve the efficiency of the institutions as the time from application submission to getting the rickshaw can take upwards of three months and payment to the manufacturer can make a further three extra months.

Regulatory Institutions

The Punjab Department of Transport currently has up to forty companies registered in its Green Punjab program even though only 10 companies have been approved and certified by the PSQCA. Although PSQCA approval is required for every manufactured product in the country, the Department of Transport skipped this requirement thus enhancing the risk of sub-standard 4-Stroke rickshaws entering the market. In certain cases rickshaws were approved and disapproved at whim by decision makers at the transport department leading the PSQCA representative to stop attending the committee meetings. The PSQCA testing process also needs to be re-evaluated as the two rickshaw companies (Qingqi and Master) for whom NBP stopped giving loans were approved by the PSQCA. According to the PSQCA, the checked product was up to the mark but over a period of time, the companies started using lower quality parts. Thus, PSQCA's man-

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[18] The Discount Rate used is the average of the 3-yr Pakistan Investment Bond from 2006 to 2008. The rate in 2006 was around 10% while the current rate is hovering around 14%.

dated four quality control trips a year to the facility need to be ensured through proper funding, access to equipment and trained man power to the organization.
The Punjab government's yearly revenue from emissions and fitness testing of vehicles in Lahore is Rs. 29,500,000. While, there are only three Motor Vehicle Examiners (MVE) in Lahore, the city of 8 million. These three MVE's have the capacity to conduct 50-60 visual inspections each in a day as complete emissions testing would require up to 30 minutes per vehicle. Though they have been given the noise meter and air pollution checking apparatus for petroleum vehicles, the equipment for diesel running vehicles which make up 80% of the commercial vehicles is not available. All three MVE are situated at Badami Bagh in a 17 kanal space which has no boundary wall and is being used as parking space by commercial vehicles of the Badami Bagh Lari Adda. The Badami Bagh location may be good for inter city buses but does not facilitate intra city transport including rickshaws, wagons and personal vehicles. Multiple testing stations across the city are required to ensure convenience and thus compliance.

Overall the Motor Vehicle Examiner section itself is in limbo as it draws its salaries from the District Regional Transport Authority under the City Government while its postings are controlled by the Department of Transportation, Punjab. Out of the thirty seven MVE posts in Punjab, seven lie vacant in this section which is the most critical institution to tackle environmental pollution. The EPA had suggested a Public Private Partnership to construct an emissions testing infrastructure in Punjab and had also sent three proposals to that effect. But the Department of Transport decided to execute the plan itself. But no steps have yet been taken by the department in this regard.

According to the High Court mandate, 2-Stroke rickshaws were banned from the roads of Lahore at the start of 2008. The Punjab Government has not been able to achieve its target to remove 2-Stroke rickshaws from the five major cities of Punjab by December 2007 but legally the 2-Stroke rickshaw can not ply the roads. Thus although 2-Stroke rickshaws still number close to 50,000 in Lahore, their token, route permit and fitness test fee has not been collected since the start of 2008 leading to a estimated government short fall of Rs.10,000,000 this year. The rickshaw drivers instead are under the assumption that the fee has been waived by the new government. Similarly though Chandgaris were banned by the government in September 2005, an estimated 20,000 still provide service in the city against government regulation.
The mandated government agency responsible for the environment EPA can legally require compliance through the Environmental Magistrate under the Environment Protection Act 1997. But the EPA is dependent on the concerned line department to execute policies while it provides recommendations, runs awareness campaigns, suggests specific proposals, lobby's various line departments and use the magisterial route as the last resort. Thus the EPA is completely dependent on the Department of Transport to implement the High Court decision.

Although a high level committee comprising of representatives of EPA, Department of Transport and the PSQCA was formed in conjunction with the rickshaw issue, better coordination through institutionalized information sharing among all departments is needed.

Stakeholder Involvement

The government policy did not fully engage the rickshaw sub-sector community. The two most affected groups in replacing 2-Stroke with 4-Stroke are the rickshaw drivers and owners and the mechanics. Although the government schemes were meant to provide ownership to existing 2-Stroke rickshaw drivers, the collateral requirements of the Green Punjab scheme – a government employee of grade 7 & above or a business owner with a three year tax return, makes it harder for the poorer segment of the rickshaw driver community to avail the scheme. Thus it is not surprising that only 50% of the surveyed 4-Stroke drivers had earlier driven a 2-Stroke rickshaw. Additionally almost 30% of the 4-Stroke rickshaw drivers drove to supplement their income rather than use it as the main source of income. According to the PSIC, about 40% of their clients were government employees while 60% were 2-stroke rickshaw drivers.

Evaluation and Summing Up

When judged on the basis of subsidized financing program, the Punjab Government provided a subsidy of Rs 28,227[19] per rickshaw and if the cost of loan defaults is included then the subsidy amount can rise to more than Rs 45,000 per rickshaw. The government still failed to shift drivers from 2-Stroke to 4-Stroke in the allotted time. The main reason for the 2-Stroke rickshaw driver to move to 4-Stroke CNG rickshaw is easier access to the customer owning to the closing of roads and localities for 2-Stroke rickshaws. Otherwise the general perception among rickshaw drivers is to do away with the 4-Stroke rickshaw because rather than providing economic gains, it has increased the liability of the rickshaw driver.
As listed in the table below, although the 4-Stroke rickshaw provides a slightly higher earning as compared to 2-Stroke, but the difference is not worth the investment and at times earning is not enough even to pay the monthly installment as warranted by the high default rates. Additionally the high maintenance costs associated with the

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[19] The amount was calculated by averaging the subsidy amounts given by the Government of Punjab. This amount does not include the cost of loan defaults.

4-Stroke rickshaw because of its new technology, low quality parts (of some manufacturers), lack of trained mechanics and high spare parts costs has created a disincentive for people to transfer to 4-Stroke, leading to a low resale value. This attests to a general lax in regulatory implementation and a lack of integrated approach to product quality evaluation among various government departments. Given that the department of transport was under severe pressure to introduce 4-Stroke rickshaws, not enough care was taken to evaluate the product quality of a new public service vehicle, which was being subsidized by the government and was crucial to the success of the government's rickshaw policy.

: Table 10 Efficiency Comparison: 2-Stroke & 4-Stroke Rickshaws

Rupees Per Work Hour	2-Stroke	4-Stroke
Revenue	67.0	70.0
Fuel Use	28.6	24.5
Income	36.9	46.2
Oil & Filter Expense	2.2	3.8
Maintenance Expense	4.2	8.0
Actual Earning	30.5	34.4

The High Court had rejected a petition which argued that 2-Stroke drivers' livelihood will be adversely affected because of government's commitment to give preference to 2-Stroke drivers in acquiring the subsidized loan. But the only way to give preference to 2-Stroke rickshaw drivers was by engaging the driver community and making them a stake holder in the success of the policy. The government rejected the suggestion of the drivers' union to replace the 2-Stroke engine with 4-Stroke and additionally incarcerated them when they protested the closing of the Mall road to 2-Stroke rickshaws. The government's actions stem from the opinion that 80% of the rickshaws are driven by contract-drivers and the rickshaw driver community is led by loan sharks who do not have the interest of drivers at heart. Though the veracity of these claims can be challenged[20], still even if accepted, the government still failed to involve any one from

[20] The survey indicated that about 60% of the rickshaws were driven by drivers who paid a daily rent to the owners. Additionally personal interviews with drivers indicate that about 1/5 of the drivers are members of the driver's union and consider it their representative body

the rickshaw sub-sector. By engaging the representatives of the rickshaw sub-sector, the government could have facilitated the acceptance of 4-Stroke rickshaw among the community. The success of the government policy required the acceptance of a new product in the market but the government did not support any marketing, training, quality assurance and customer service efforts considering them the sole responsibility of the manufacturers.

To make the new 4-Stroke CNG rickshaw a success, the Department of Transport needs to take the stake holders on board and devise a plan to train additional mechanics, educate 2-Stroke rickshaw driver to better maintain 4-Stroke, ensure fulfillment of manufacturers' warranty and facilitate indigenization of spare parts to decrease costs.

The Government policy suffered from a structural flaw as it was only replacing 2-Stroke rickshaws in the five largest cities of Punjab. This meant that the replaced 2-Stroke rickshaws would make their way to smaller towns effectively increasing the pollution problem there. The government policy is highly biased in favor of large cities and does not effectively lead to lower pollution in totality. Since the introduction of current policy, the 2-Stroke resale value has decreased by about 50% and the 2-Stroke rickshaws have been making way to smaller cities.

Evaluating the Government's response to the High Court decision, not much has been achieved.
Out of all the mandated requirements, the Department of Transport has only made some progress on decreasing wagons from city centers and on introducing the 4-Stroke rickshaw. But these initiatives have not been successfully completed. The other three main requirements including replacing diesel buses, setting new AAQ, emission and fuel standards and setting up the infrastructure to measure, inspect and monitor have been completely ignored. This only signifies the discrimination between rickshaws and buses in policy implementation. While 2-Stroke rickshaws have been banned from the Mall road, diesel buses still run there owing to the comparative strength of the concerned party. More importantly there has been absolutely no progress on matters requiring institutional change or improved capacity of government departments.

A serious effort towards resolving all issues highlighted by the High Court would have been to devise a comprehensive transport policy for the city concentrating on reducing vehicular emission through an efficient public transport system with rickshaw (a personal taxi service) policy as an integrated part. It is not well understood why the government concentrated on rickshaws while ignoring all other aspects of the High Court mandate. But when comparing with the powerful lobby of Bus Transporters and internal inertia of the Department of Transport[21], the un-organized rickshaw sector seems the easiest pick for the government to show progress nudged by new 4-Stroke CNG rickshaw manufacturers who saw a huge market with the ban of 2-Stroke rickshaws.

Even in the case of rickshaws, the government policy has not been successful. The 2-Stroke rickshaw still dominates the city with no clear implement able plan to replace it with 4-Stroke at the earliest. The laws on the books and the current reality on the ground are vastly different and their gulf increasing. The government has stopped collecting taxes on rickshaws as all 2-Stroke rickshaws have become illegal in 2008 according to the High Court decision. Thus the citizens are worse off than 2005 as the High Court decision has led to no change in pollution while the government will have a yearly short fall of Rs. 10 million.

: Table 11 Measuring Progress of the High Court Decision

Mandate	Status
Replace Diesel Buses with Euro-II compliance buses by end 2007	No Progress
Remove Wagons from city center & if required use Euro II standard wagons	Some Progress – Wagons are back again as enough buses don't follow certain routes
Replace 2-Stroke Rickshaw with 4-Stroke by end 2007	Some Progress
Set short & long term Ambient Air Quality, Emission & Fuel standards	Two new stations have been setup
Setup AAQ squads and stations and take effective measure for inspection & monitoring stations in a year	No Progress

Also the emissions standards mandated by the High Court (as recommended by the Lahore Clean Air Commission after a new of deliberations) have been completely ignored. Though the Punjab EPA accepts that the current emission requirements are out of date as they were set in 1993, it can not act on its own and are dependent on the PEPC to revise the standards. According to the EPA, the fulfillment of the court order was the responsibility of the Department of Transport (DoT) and thus it is DoT's responsibility to get PEPC to change environmental standards to comply with the court order.

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21 Seven posts of Motor Vehicle Examiners still lie vacant across Punjab. The department is under-trained, under-equipped and does not have the needed resources to carry out its tasks.

Findings

It was High Courts' decision to entertain the petition and its subsequent judgment which led to the creation of government's rickshaw policy to replace the polluting 2-Stroke rickshaws with relatively green 4-Stroke CNG rickshaws. The main thesis of the Green Punjab scheme was to provide the 4-Stroke CNG rickshaws as a feasible alternative through government subsidy by making it easier and economically viable for drivers to buy 4-Stroke CNG rickshaws. The following table shows funds allocated by the Government of Punjab towards the scheme.

: Table 12 Punjab Government Development Funds Allocation for Environment

Year	Development Fund (Rs. Million)
2007-08	18.844
2008-09	50
2009-10	850
2010-11	224.156

But research indicates that economic viability of new 4-Stroke CNG rickshaw is questionable at least until its maintenance costs decrease. Thus if the current policy is to succeed, lowering of maintenance costs has to be the prime focus. Similarly it is imperative to evaluate other policy alternatives given that the current policy has not provided the needed results. This section explores one such policy alternative.

Alternative Policy Option:
Replace 2-Stroke with 4-Stroke Engine in Existing Rickshaws

One alternative to the existing policy is to replace the existing 2-Stroke engine with the 4-Stroke engine in existing rickshaws. A few engineers and mechanics have successfully converted the 2-Stroke engine into 4-Stroke and would like the government to allow putting this engine in existing rickshaws, thus fulfilling the environmental regulations. The Sindh Government has accepted this alternative giving a timeframe of 30th of June 2010 to convert all existing 2-Stroke rickshaws into 4-Stroke. It is not yet clear if the Sindh Government would require a CNG rickshaw to install the CNG kit as mandated in its policy. That would have an additional cost of Rs 18,000.

Although a used 2-Stroke engine can also be converted, the converted engine can not be provided a warranty because of other used parts in the engine. This process would involve a cost of Rs 15,000 plus five labor days opportunity cost for the driver totaling Rs 16,760 [22]. But a new 2-Stroke engine costing Rs 16,000 is converted to 4-stroke engine with a total cost of Rs 28,000. The process involves replacing few parts (Cylinder, Head, Piston, Carburetor, Air Cleaner, Timing Chain, Silencer and Engine Shield) of the engine with 4-Stroke technology. Most parts used in the engine are locally made except the Head Piston, Cylinder, Barring and Carburetor which are imported from China or India (via Dubai) and the import cost for each conversion is only Rs 4,600 compared to Rs 25,000 for the 4-Stroke engine. The initial investment of Rs 100,000 employs 6 people (Welder, Electrician, 2 Khiradias, Mechanic – 2-Stroke & 4-Stroke) to produce five 4-Stroke engines a day. Added investment would be required to produce enough engines to replace all 2-Stroke engines in the current rickshaws.

: Table 13 Imported Parts

2-Stroke	Converted 4-Stroke	4-Stroke Engine
Piston, Carburetor	Cylinder, Head, Piston, Carburetor, Timing Chain	Complete Engine

Additionally once the engine is ready, it takes only a couple of hours to convert an existing 2-stroke rickshaw into a 4-stroke without replacing any other part. Thus the total cost to the rickshaw driver to convert his 2-Stroke rickshaw to 4-Stroke is 28,000 – 3,000 (for 2-Stroke engine sold as scrap) = Rs 25,000. The following table compares the mileage of the converted engine with the imported 4-Stroke engine to show that they are comparable.

The regulatory process is moving ahead in Sindh but no progress has yet to be made in the Punjab. The EPA, Punjab had earlier tested three 2-Stroke to 4-Stroke converted engines but did not approve them. In one case, the manufacturer took the Department of Transport to court because the engine was not tested by the PSQCA, but the PSQCA also rejected the engine as it did not pass the standards. The main reasons were that the conversion was not based on a design and no designer or engineer was part of the conversion process.

22 The five days of lost earning of the driver is included to calculate the total cost

: Table 14 Rickshaw Mileage Based on Fuel & Engine

Mileage in Km	2-Stroke	Converted 4-Stroke	4-Stroke
Petrol (1 ltr)	18	35	25-30
CNG (1 kg)		50	40 – 50
LPG (1 kg)	30	60	60

The Department of Transport additionally argues that it will be hard to verify rickshaw fitness because an earlier experience with installed meters involved rickshaw drivers fitting someone else's meter to pass the Fitness test. Thus another reason for a lack of interest in this initiative is the lack of trust between the parties. No doubt, it will be harder to verify if the same rickshaw has a 2-stroke or a 4-stroke engine and given that the converted 2-stroke engine can be replaced in a couple of hours, it will be harder to regulate. The driver's union president though has pledged to take responsibility to convert 2-Stroke to 4-Stroke in cooperation with the government using a monthly installment scheme of Rs 1000. Thus a basic reason for limitation in policy options is a both a confrontational relationship between the driver's union and the administration as well as a lack of significant driver representation in the driver's union.

This policy option had been suggested earlier. Though a successful conversion could have satisfied that environmental concern, the Department of Transport made additional requirements to include that the back door be 18" (it was 12" for 2-Stroke rickshaws), shock absorption (suspension) be improved, back seat be moved by 6" to allow for a CNG cylinder and ample leg room. With these new requirements the conversion of 2-Stroke to 4-Stroke CNG would cost Rs 75,000.
Most 2-Stroke rickshaws have already been converted from petrol to LPG gas which costs ~ Rs 1700 while the CNG conversion kit costs Rs 18,000 – 20,000 and are rarely installed because of the cost. Thus one can expect that a converted 4-stroke rickshaw will run on petroleum or LPG which are a dirtier fuel than CNG.

A benefit of this option is that the 2-Stroke rickshaw can be converted into 4-Stroke at 1/5 the cost of the current policy saving Rs 20,000 in import costs per rickshaw. The average subsidy of Rs 28,227 provided by the government on each 4-Stroke rickshaw can be used to convert the current 2-Stroke rickshaw into 4-Stroke. While the actual government costs of around Rs 45,000 inclusive of the cost of loan defaults is enough to convert the existing 2-Stroke rickshaw to 4-Stroke CNG rickshaw as the CNG kit costs between Rs 18,000 – 20,000.

Additionally, the economic costs to the rickshaw sub-sector including the drivers and mechanics will be minimal as compared to the current policy which threatens the existing livelihood of at least 40% (20,000) of the rickshaw drivers who own their 2-Stroke rickshaws and the 4,000 mechanics who have not been trained in 4-Stroke rickshaw engine. The converted 4-Stroke engine would also require training but the extent of training need will be far less than that for the new 4-Stroke engine.

Learning from International Experiences

There is considerable international literature on the environmental dimension of urban transport. Given the scale and speed of urbanization in Asia, researchers have termed current urban transport policies of mega cities un-sustainable. A major difficulty is that the policy makers have not shifted focus from personalized transport to public transport, requiring significant energy resources as well as the road infrastructure [23]. Thus even with more stringent emission levels and regulatory implementation, only PM levels are projected to decrease while the CO_2 and NO_x levels will continue rising due to increased motorized transport on the roads [24].
In Pakistan urban transport policies remain deficient in research usage. For robust transport policy research is required in the following areas:

- Quantification of Emissions: This would include quantification in terms of type of transport: 1) Two wheelers, Three wheelers, Cars, Buses, Trucks etc. 2) Passenger versus Freight 3) Private versus Public, in terms of fuel used: CNG, Petrol, Diesel, Mixed Fuel, in terms of transportation infrastructure use: Urban, Rural, Highways. The analysis should include projected growth of vehicles taking into account economic growth and urbanization.
- Consumption of Energy: This requires a macro level assessment of the use of energy (fuels) in transport. Given Pakistan's high import bill of fuels, it is important to link the transport and energy policies to have a sustainable urban transport policy. Additionally the quality and use of oil in the domestic transport market needs to educate the transport policy.
- A documented study on the effects of PM and general air pollution on morbidity and premature mortality to assess overall health costs to society and to the State in terms of public health costs.

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23 N. V. Iyer & Jitendra Shah, Sustainable Transport: A Sourcebook for Policy Makers in Developing Countries (GTZ, 2009) p5

24 Sudhir Gota & Bert Fabian, Emissions from India's Intercity and Intracity Road Transport (CAI Asia, May 2009) p1

The international experience also lists methods to decrease emissions of the 2 and 3-wheelers, without a complete overhaul of the urban transport system. These include examples of 'Direct Retrofit' kit for 2-Stroke engines which reduces fuel consumption by 35%, oil consumption by 54%, CO_2 by 61% and HC & NO_x by 74%[25] and improved vehicle maintenance providing better fuel economy and emissions. Similarly an 'Oxidation Catalytic Converter'can reduce the PM and HC by 50% while reducing oil use proportionally.

But it is the learning from the successful implementation of an overhauled transport policy leading to improvement in air quality that should inform future initiatives. The leading example is Delhi where a seminal Indian Supreme Court decision led to a change in the urban transport policy. The Lahore High Court decision was in the same vein but as indicated by the following differences in approach and implementation, it has not led to the same effect.

- Informed by existing transportation research and experts in the field, the Indian Supreme Court took a decision based on prevailing technical and institutional realities. The Court concentrated on conversion to CNG and ordered conversion of all diesel buses, of 2-Stroke rickshaws because it understood that fuel and oil adulteration could not be restricted in the current regulatory regime while CNG being gaseous did not lend itself to adulteration. Similarly the Court mandated 'Premix reforms' requiring filling stations to mechanically mix oil lubricant with gasoline for 2-Stroke engines. Additionally the court mandated the age of the vehicle rather than emissions as the deciding factor in its removal from the roads because it was the easiest to regulate[26].
- The mandated committee advising the Indian Supreme Court was headed by a respected retired civil servant, had representatives from all stake holders including transporters and environmental NGOs. The committee remained engaged throughout the implementation process providing expert advice to the court on issues brought up by transporters, government and other stake holders helping the Court to make decisions on hurdles put up during the implementation process.
- The Supreme Court remained engaged after the decision. Its active engagement in evaluating progress on implementation of its decision extended to the point of micro-management and gave a clear indication to the government that it

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25 N. V. Iyer & Jitendra Shah, Sustainable Transport: A Sourcebook for Policy Makers in Developing Countries (GTZ, 2009) p19

26 Bell, Mathur, Narain, Simpson (etal), *"Clearing the Air: How Delhi Broke the Logjam on Air Quality Reforms"* Environment (V 46 N3, April 2004), p27

was serious in the implementation of its decisions. Even when half of the diesel buses went off the road in April 2002 causing hardships to citizens, it stuck to its decision leading to all buses being converted to CNG by December 2002. The Court regularly asked the government regarding progress made and when a party could not comply with the set deadline, the Court invariably asked what they had done up till then to comply with the order. Thus it used the threat of fines and contempt of Court for private parties and government officials to meet the set deadlines.

- The role of media was also instrumental in keeping the story in the front pages. Though the political parties understandably took both pro and against positions, it was the public support of the process both articulated and nurtured by the media that allowed the Court to move beyond the hiccups in the process.

Recommendations

The Lahore Clean Air Commission which included government and citizen representatives had devised comprehensive overall goals to limit environmental pollution in the city of Lahore. The High Court accepted most of its recommendations but their implementation has either not been carried out or has hit major hurdles. Based on research and analysis of the rickshaw sub-sector, we recommend the following to help devise a comprehensive policy, conduct institutional capacity building, strengthen interdepartmental linkages, create environmental awareness and convince stake holders of the advantages of the policy.

Devise Policy for a complete Public Transport System with rickshaws as a part: The Lahore Commission or the High Court decision does not discuss the structural causes of environmental pollution- the lack of an efficient green public transport system which provides concrete alternatives to the current personalized mode of transportation.
An efficient public transport system will also require a concrete policy for rickshaws which integrates them with the transport system. This would include limiting the numbers of rickshaws according to the needs of the city and establishing queue stands for rickshaws at various junctions in the city with fixed publicized zonal fares.
The lack of restriction on the number of rickshaws (route permit issued) in Lahore suggests a complete lack of transport policy for the city. According to the EPA, only 30,000 rickshaws are needed in Lahore based on its population needs compared to the 65,000 rickshaws that ply the city [27]. This is an environmental, traffic as well as an economic issue as an excess of rickshaw drivers leads to low income for all. The oversupply of rickshaws is itself a policy deficiency. The government needs to study and then regulate the number of public service vehicles in a district.

Define an environmental standards schedule for 2015: The court had mandated a comprehensive schedule of environmental standard requirements till 2013 but neither the

Department of Transport Punjab nor the EPA Punjab has taken up the matter with the PEPC to update its environment quality standards (NEQS) set in 1993 to bring them in line with the High Court decision. The emissions standards currently include CO and PM ignoring SO_2, NO_x and HC.

Conduct capacity building of Vehicle Emission Regulatory Institution: Irrespective of the rickshaw policy strategy, a working Vehicle Emissions Regulatory Institution is an immediate need. With a huge induction of public service and personal vehicles in the last five years, it is important that emissions' testing becomes a regular feature in the regulatory framework. To gain public trust, this institution should be developed along the lines of Motorway Police or the new traffic wardens. But a complete lack of institutional experience and limited capital in the current economic scenario, a more practical approach would be a public-private partnership; a few proposals have been given to the EPA encompassing Lahore or the whole province of Punjab. The proposal envisages a private party acquiring land and creating infrastructure throughout the province, charging an extra Rs 150 to the customer over the Rs 350 currently charged by the government. The transport department needs to evaluate current proposals as well as solicit from other parties to devise an organized, efficient and corruption free motor vehicle examination system. Negotiations should require that customers pay no additional cost and to supplement lost government revenue, personal vehicles should also be included in the program over a period of time. But a functioning system of motor vehicle examination is the most critical element for controlling pollution as it is the most effective way to ensure compliance with the mandated environmental standards.

Use Information Technology to share information across government departments: All successful policy implementations require an integrated communication among the various regulatory bodies including Federal and Provincial. The vehicle registration has been computerized by the Excise & Taxation department. The need is to link this information with the Regional and District Transport Authority such that up to date information for a particular vehicle can be accessed by the Traffic Police, Transport Department, The Vehicle Emissions Testing department (MVE) and the EPA. This integrated information system can remove regulatory loopholes, allow for better transport management and formulation of future policies. The CPPG can facilitate the government in this e-governance initiative.

Involve stake holders and facilitate the Rickshaw Driver's Union to become a representative body of rickshaw drivers: An autonomous and representative rickshaw driver's union will facilitate policy implementation if their point of view is heard during the decision making process. Thus it is suggested that the transport department encourage making

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27 Amir Butt, researcher at the Punjab Urban Resource Centre put the figure at 80,000.

the rickshaw driver's union more representative and democratic. A representative rickshaw driver's union that can speak and negotiate on behalf of the rickshaw drivers is the easiest way to regulate rickshaw driving in the city as it will reduce policy compliance costs and overhead costs (the high loan default rates which heighten the burden on the government) because of peer pressure and encouragement. By providing environment awareness, driver and mechanic training programs (on 4-Stroke rickshaws) through the union platform, the government can both strengthen the union, win driver good will and build the needed rickshaw sub-sector capacity required to lessen maintenance costs of 4-Stroke rickshaws. Additionally an organized body can initiate value added services such rickshaw phone taxi service.
It is thus recommended that the transport department engage the rickshaw driver and mechanic communities (who are the most affected in 2-Stroke to 4-Stroke change) to influence their perception and most importantly to make them stake holders in the environmental and transport improvement initiative. An organized rickshaw driver union with government oversight can also help in making sure that most government subsidized loans benefit the affected- the 2-Stroke rickshaw drivers. CPPG can facilitate this process by working in conjunction with government, non-governmental labour organizations and the rickshaw sub-sector stakeholders.

Use media to publicize government policy targets and raise awareness: The government does not need to buy advertisements to publicize its policy but instead media can be contacted to raise awareness through social issues oriented programming on environment and transport. As long as the government is willing and able to defend its policy position, media can be very beneficial. In addition, government can partner with policy institutes such as CPPG, educational institutions and environment based NGOs for maximum public awareness.

Take proactive measures to re-brand 4-Stroke rickshaws: The existing government policy has not achieved its objective of removing 2-Stroke rickshaws from the streets of Lahore because the alternative 4-Stroke rickshaw is not economically feasible. The government would need to take aggressive steps to reestablish the 4-Stroke brand by involving manufacturers to train 2-Stroke mechanics on their 4-Stroke technology, facilitate indigenization of spare parts to lower costs and improve quality assurance regulation to improve the quality of the vehicle as well as the manufactured spare parts. The largest 4-Stroke CNG rickshaw company only has one maintenance centre in Lahore which is not practical for such a large city. Though a few 4-Stroke CNG companies have started providing mobile support, it is important that the government facilities broader maintenance and support.

Explore alternative policy option of converting existing 2-Stroke rickshaw to 4-Stroke CNG: Government's has the option to stop subsidizing 4-Stroke rickshaws and instead concentrate on converting all existing 2-Stroke rickshaws to 4-Stroke by replacing the

engine. The government would need to make some initial investment to scale up the conversion operations and provide a loan facility to rickshaw drivers to replace their engine. A CNG kit can be installed for an additional cost. The driver's union can take the responsibility to convert all rickshaws to 4-Stroke as well as the repayment of the loan. Under the current circumstances with High Court deadline of 2007 past due and a recurring income loss of Rs 10million per annum [28],the government should serious consider the second option. The government's objective should be to limit pollution at the earliest and thus both 4-Stroke CNG rickshaws as well as converted 4-Stroke rickshaws should be allowed to replace the existing 2-Stroke polluting rickshaws.

Regulate Engine Oil: The quality of oil makes an impact on the vehicular emission of rickshaws. Currently government regulation is extremely weak concentrating on intermittent raids on consumer markets to stop the sale of low quality oil but little or no concentration is made to regulate the supply side cottage industry which provides 'recycled' oil.

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28 Because of a ban on 2-Stroke rickshaws, the government is losing the revenue from Route Permit and Vehicles Emissions Fitness Test.

Appendix A: Tables and Figures

Appendix B: Rickshaw Driver Survey Form

Type of Rickshaw: 2 Strk 4 Strk (Did u drive 2Strk before: Y / N)

Rickshaw Make: _____

How long have you been driving rickshaw: ____ Yrs Driving 4-Str _____ Yrs

You are: Owner (Paid: Cash Installment) Driver (Rent Paid: _____)

Do you own any other rickshaws ____

Dealer / Bank _____ Scheme _____

LumpSum Cash Price: _____ Rs

Instllmnt: Bank Chrges: _____ DownPymt_____ Installment _____ # ___ mths

Whose Name Used for Guarantee: _____

Fuel Used: Petrol CNG LPG

Hours u drive: ____ hrs Do you share / Is there another driver for Rickshaw: Y / N

Another source of income: Y ___ N ___ How much do you earn from other _____

Avg Daily Travel: ____ km Avg Un-prod Trvl: ____ km Avg Prod Trvl: ____ km

Charge Per KM: _____ Rs

Daily Revenue: _____ Rs Daily Fuel Cost: _____ Rs Food _____ Daily Earning: _____ Rs

Monthly Earning: _____ Rs Changes in last 2 Yrs _____ 6Mths

_____

Mthly Maintenance Cost: _____ Rs Tuning, Oil, Filters _____ Rs

Unexpected & Parts _____ Rs

Monthly Take Home: _____ Rs

Token Charge _____ Rs per ____ Yr

Passing _____ Rs per ____ Yr

Are you member of union: Y / N _____

# of Dependents: ____

General Recommendations:_____

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